



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,678	10/17/2003	Shang-hyeun Park	030681-580	8287

21839 7590 06/01/2006

BUCHANAN INGERSOLL PC
(INCLUDING BURNS, DOANE, SWECKER & MATHIS)
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404

EXAMINER

QUARTERMAN, KEVIN J

ART UNIT	PAPER NUMBER
----------	--------------

2879

DATE MAILED: 06/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/686,678

Applicant(s)

PARK ET AL.

Examiner

Kevin Quarterman

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 16-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 16-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2, 16-19, and 22-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakatani (US 6,008,576).
4. Regarding independent claim 1, Figure 3 of Nakatani shows a field emission device comprising a substrate (6); a cathode (3a) formed on the substrate; a gate insulating layer (5b) formed above the substrate and having a well exposing a portion of the cathode; an electron emitter (1) formed on the exposed portion of the cathode; and a gate electrode (2a) formed on the gate insulating layer and having a gate hole corresponding to the well, wherein the gate electrode further includes a cylindrical electrode part that is capable of forming a focusing electric field from the gate hole toward a proceeding path of an electron beam.
5. Regarding claim 2, Figure 3 of Nakatani shows the cylindrical electrode part being a Bellmouse shaped electrode part that broadens in the direction of propagation of the electron beam.

Art Unit: 2879

6. Regarding claim 16, Figure 3 of Nakatani shows the electron emitter including micro tips.

7. Regarding claim 17, Figure 3 of Nakatani shows the electron emitter including micro tips.

8. Regarding independent claim 18, Figure 3 of Nakatani shows a field emission device comprising a substrate (6); a cathode (3a) formed on the substrate; a gate insulating layer (5b) formed above the substrate and having a well exposing a portion of the cathode; an electron emitter (1) formed on the exposed portion of the cathode; and a gate electrode (2a) formed on the gate insulating layer and having a gate hole corresponding to the well, wherein the gate electrode further includes a cylindrical electrode part having one end closer to the substrate that has a smaller radius and another end further from the substrate having a larger radius, and a surface between the one and the other end such that upon application of an electric field, a converging electric lens is formed at a proceeding path of an electron beam emitted from the electron emitter.

9. Regarding claim 19, Figure 3 of Nakatani shows the cylindrical electrode part being a Bellmouse shaped electrode part that broadens in the direction of propagation of the electron beam.

10. Regarding claim 22, Figure 3 of Nakatani shows the electron emitter including micro tips.

11. Regarding claim 23, Figure 3 of Nakatani shows the electron emitter including micro tips.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 3-4 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani (US 6,008,576) in view of Hsu (US 6,448,701).

15. Regarding claims 3-4 and 20-21, Nakatani teaches the limitations of the claimed invention discussed earlier but fails to exemplify the electron emitter including carbon nanotubes.

16. Hsu teaches that it is known in the art to provide field emission devices with emitters including carbon nanotubes for reducing the operating voltage of the field emission device (col. 3, ln. 56-60).

Art Unit: 2879

17. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the field emission device of Nakatani with emitters including carbon nanotubes, as taught by Hsu, for improving the emission efficiency of the device.

18. Claims 5-6 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani (US 6,008,576) in view of Cade (US 5,942,849).

19. Regarding claims 5-6 and 24-25, Nakatani teaches the limitations of the claimed invention discussed earlier but fails to exemplify a double gate electrode in which an additional gate electrode is formed beneath a gate electrode on which the cylindrical electrode part is to be formed.

20. Figure 3a of Cade teaches that it is known in the art to provide field emission devices with a double gate electrode (4, 7) in which an additional gate electrode (4) is formed beneath a gate electrode (7) on which the cylindrical electrode part is to be formed. Cade discloses that the double gate electrode structure is provided for controlling emission from selected areas of the cathode by applying appropriate voltages to the gate electrodes, thereby enhancing the performance of the device (col. 1, ln. 51-55).

21. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the field emission device of Nakatani with the double gate electrode structure taught by Cade for improving the efficiency of the device.

Response to Arguments

22. Applicant's arguments, received 25 April 2006, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly discovered references.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takagi (US 5,786,659) discloses an electron field emission device. Betsui (US 5,489,933) discloses a field emission microcathode array. Komatsu (US 5,448,132) discloses an array field emission display device.

Art Unit: 2879

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571) 272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin Quarterman
Examiner
Art Unit 2879

kg
23 May 2006


NIMESHKUMAR D. PATEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800